

IN THE DRAWINGS:

By this Amendment, the Applicant adds Figure 8C, which is listed in the description of the drawings, but was omitted inadvertently when this non-provisional patent application was filed. Since this application incorporates the provisional application by reference in its entirety, the Applicant does not believe that the addition of Figure 8C adds new matter to this application. Figure 8C is appended to this amendment. Figure 8C is described at least in paragraphs [0011] and [0038].

REMARKS

Claims 1, 32, and 45 have been amended. No claims have been added or canceled. Accordingly, after entry of this Amendment, claims 1-72 will remain pending.

As a preliminary matter, the Applicant adds Figure 8C, which is listed in the description of the drawings, but was omitted inadvertently when this non-provisional patent application was filed. Since this application incorporates the provisional application by reference in its entirety, the Applicant does not believe that the addition of Figure 8C adds new matter to this application. Figure 8C is appended to this amendment. Figure 8C is described at least in paragraphs [0011] and [0038].

The Applicant gratefully acknowledges the Examiner's indication that claims 29, 42, 44, 59, 60, 69, and 70 are allowable over the prior art. At this time, the Applicant does not amend these claims. However, the Applicant reserves the right to re-present the subject matter encompassed by these claims at a later date, if so desired.

In the Office Action dated June 14, 2005, the Examiner rejected claims 1, 9-21, 24, 25, 30, and 32 under 35 U.S.C. § 103(a) as unpatentable over Jacob (U.S. Patent No. 4,362,632) in view of Thornton et al. (U.S. Patent No. 4,441,092). Claims 2 and 41 were rejected under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Wickramanayaka et al. (U.S. Patent No. 6,462,482). The Examiner rejected claims 3, 4, 39, and 40 under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Salimian et al. (U.S. Patent No. 5,656,123). Claims 5 and 35 were rejected under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Singh (U.S. Patent No. 5,309,063). The Examiner rejected claims 6 and 36 under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Chen et al. (U.S. Patent No. 6,155,199). Claims 7 and 38 were rejected under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Imahashi et al. (U.S.

Patent No. 5,537,004). The Examiner rejected claims 8 and 37 under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Keller et al. (U.S. Patent No. 5,767,628). Claim 22 was rejected under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Mavretic et al. (U.S. Patent No. 6,424,232). The Examiner rejected claim 23 under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Kondo et al. (U.S. Patent No. 6,462,628). Claim 26 was rejected under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Ball et al. (U.S. Patent No. 5,315,611). The Examiner rejected claim 28 under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Williams et al. (U.S. Patent No. 5,889,252). Claims 33 and 43 were rejected under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Hong (U.S. Patent No. 6,695,954). The Examiner rejected claim 34 under 35 U.S.C. § 103(a) as unpatentable over Jacob in view of Thornton et al. and further in view of Shamouilian et al. (U.S. Patent No. 6,095,084). Claims 45-58, 61, 62, 66, 67, 68, 71, and 72 were rejected under 35 U.S.C. § 103(a) over Collins et al. (U.S. Patent No. 5,392,018) in view of Van Gogh et al. (U.S. Patent No. 6,579,426). The Examiner rejected claim 63 under 35 U.S.C. § 103(a) as unpatentable over Collins et al. in view of Van Gogh et al. and further in view of Hong. Claim 64 was rejected under 35 U.S.C. § 103(a) as unpatentable over Collins et al. in view of Van Gogh et al. and further in view of Shamouilian et al. The Examiner rejected claim 65 under 35 U.S.C. § 103(a) as unpatentable over Collins et al. in view of Van Gogh et al. and further in view of Ball et al. The Applicant respectfully disagrees with each of the rejections and, therefore, respectfully traverses the rejections.

The Applicant respectfully submits that claims 1-31 are patentable over the references cited by the Examiner because they now recite a high power, radio frequency matching network for a plasma processing system that combines features including, among others, one or more

variable inductive elements including a magnetic core, a helical coil, and an actuator configured to physically translate the magnetic core through the helical coil and one or more fixed capacitors, and only fixed capacitors, operatively coupled to the inductive elements. Claims 32-44 are patentable over the references cited by the Examiner because they now recite a plasma processing system combining a number of features including, among them, one or more variable inductive elements including a magnetic core, a helical coil, and an actuator configured to physically translate the magnetic core through the helical coil and one or more fixed capacitors, and only fixed capacitors, operatively coupled to the inductive elements. Claims 45-72 are patentable over the references cited because they now recite a high power, radio frequency matching network assembly for a plasma processing system that combines a number of features including, among them, a plurality variable inductive elements each having a magnetic core, a helical coil, and an actuator configured to physically translate the magnetic core through the helical coil and one or more fixed capacitors, and only fixed capacitors, operatively coupled to the inductive elements. The Applicant respectfully submits that none of the references, either alone or in combination, describes or suggests the subject matter of the claims as now presented for examination. Accordingly, the Applicant respectfully requests that the rejections set forth by the Examiner be withdrawn so that this application may be passed quickly to issuance.

Jacob merely describes a gas discharge apparatus combining a variable inductor 44 and variable capacitors 42, 48. (See, e.g., Jacob at col. 2, lines 54-66.) Jacob fails to describe a variable inductor with an actuator that physically translates the magnetic core through the helical coil. Jacob also fails to describe anything other than variable capacitors 42, 48 connected to the variable inductor 44. Accordingly, Jacob fails to describe at least two of the features recited by claims 1-72 and, as a result, cannot be relied upon to render obvious claims 1-72.

Thornton et al. fails to cure the deficiencies noted with respect to Jacob. Thornton et al. describes nothing more than a variable inductor. While Thornton et al. does describe that the

variable inductor includes a magnetic core 161 that is axially moveable within the interior of the coil 113, there is no discussion no discussion in Thornton et al. of combining the variable inductor with only fixed capacitors to arrive at the combinations recited by claims 1-72. Accordingly, Thornton et al. cannot be combined with Jacob to render any of claims 1-72 unpatentable.

Wickramanayaka et al. does not assist the Examiner in the rejection of the claims because it does not describe, among other things, combining a variable inductor with a translatable magnetic core and only fixed capacitors as parts of a high power, radio frequency matching network for a plasma processing system, a plasma processing system, or a high power, radio frequency matching network assembly for a plasma processing system. While Wickramanayaka et al. does discuss a matching network 32, an inductor 34, and a capacitor 35, there is no discussion of any details concerning these elements. Accordingly, Wickramanayaka et al. cannot be relied in combination with Jacob and Thornton et al. to render obvious any of claims 1-72.

Salimian et al., Singh, Chen et al., Imahashi et al., Kondo et al., Ball et al., Williams et al., Hong, and Shamouilian et al. are similarly deficient, providing no relevant details, among other things, about a combination of a variable inductor with a translatable magnetic core and only fixed capacitors as parts of a high power, radio frequency matching network for a plasma processing system, a plasma processing system, or a high power, radio frequency matching network assembly for a plasma processing system.

Keller et al. also fails to assist the Examiner. In contrast to the present invention, Keller et al. describes a helicon plasma processing tool with a matching network illustrated in Fig. 1B. Details about the induction coil 27 and the capacitors (not numbered) are not provided. (See, e.g., Keller et al. at col. 4, lines 41-51.) However, based on the brief discussion and Fig. 1B, it would appear that the induction coil 27 is fixed and the capacitors are variable, which differs

significantly from the claimed invention. Accordingly, Keller et al. cannot be relied upon in combination with other references, notably Jacob and Thornton et al., to render any of claims 1-72 obvious.

Mavretic et al. also does not assist the Examiner with the rejection of claims 1-72. Mavretic et al. describes a method and apparatus for matching a variable load impedance with an RF power generator impedance. With reference to Fig. 3, Mavretic et al. discusses the network 220 as containing at least one fixed-value capacitor 312 and, optionally, a fixed inductance 307. (Mavretic et al. at col. 4, lines 38-60.) With respect to matching the variable impedance of a load with the fixed impedance of an RF power generator, Mavretic et al. describes that the “present invention provides a solid state impedance matching network 220 (“network 220”) that employs no moving electrical or mechanical parts . . .” (Mavretic et al. at col. 4, lines 8-11.) Accordingly, Mavretic et al. cannot be relied upon in combination with other references, such as Jacob and Thornton et al., to render any of claims 1-72 obvious.

Collins et al. also does not assist the Examiner with the rejection of the claims. Specifically, Collins et al. describes a coil 82 without a moveable core, among other things. (Collins et al. at Fig. 6A and at col. 6, lines 5-15.) With respect to the capacitors 72, 76, 72', 76' illustrated in Figs. 3 and 4, no guidance is provided to determine if they are fixed or variable. Accordingly, Collins et al. also fails to describe or suggest the invention as recited by claims 1-72.

Van Gogh et al. also fails to assist the Examiner with the rejection of claims 1-72. The Applicant recognizes that Van Gogh et al. tunable inductors 318, 320 with core pieces 318c, 320c that can be shifted. (See, e.g., Van Gogh et al. at col. 16, lines 54-67.) However, no embodiment discusses combining a variable inductor with a translatable magnetic core and only fixed capacitors as parts of a high power, radio frequency matching network for a plasma processing system, a plasma processing system, or a high power, radio frequency matching

network assembly for a plasma processing system. In each embodiment, the capacitors are variable. (See, e.g., Van Gogh et al. at col. 6, lines 1-6, with reference to capacitors 310, 312.) Accordingly, Van Gogh et al. also may not be combined with other references, like Collins et al., to render any of claims 1-72 obvious.

In view of the above amendments and remarks, Applicants respectfully submit that all of the claims are allowable and that the entire application is in condition for allowance.

Should the Examiner believe that anything further is desirable to place the application in better condition for allowance, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,
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